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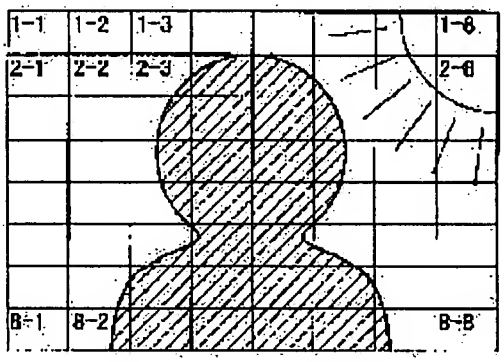
(54) BACK LIGHT SCENE DETERMINING METHOD, COMPUTER-READABLE STORAGE MEDIUM WITH BACK LIGHT SCENE DETERMINING METHOD PROGRAM STORED THEREIN AND IMAGE PROCESSOR HAVING BACK LIGHT SCENE DETERMINING FUNCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To determine whether an image which is picked up is a back light scene or not, through the use of digital image data picked up by a digital camera and a scanner.

SOLUTION: An input image is divided into a plurality of regions 1-1 to 1-8, and lightness is obtained for each area. A first determination is executed based on the number of areas having the lightness of not less than a prescribed threshold. When a back light scene is determined in the first determination, color saturation distribution is obtained from whole image data and second determination is executed based on the color saturation distribution. Since the color saturation of the overall image is low and the color saturation distribution is concentrated on a small value in the case of real back light, lightness information and the color saturation information are used. Thus, the real back light scene can be discriminated from a case, when a dark part exists in a part of the image.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the backlight scene judging approach that the inputted image judges whether it is a backlight scene, in the digital camera and scanner which used the color solid state image sensor.
[0002]
[Description of the Prior Art] Generally, very bright parts, such as the light source, exist behind main photographic subjects, and a backlight scene means the condition that main photographic subjects are shade. If automatic exposure adjustment of a camera is performed under such conditions, in response to the effect of the brightness of a part with bright brightness sensors, such as an exposure meter and a solid state image sensor, the part of main photographic subjects will serve as a underexposure. Therefore, such a backlight scene is conventionally distinguished automatically by the camera side, and amending the exposure conditions acquired by the exposure meter, the solid state image sensor, etc. is proposed. For example, the inside of a screen is divided into two or more fields, and it is possible to judge whether it is a backlight scene by measuring brightness for each [which was divided] field of every, and asking for the ratio of the bright field more than a certain threshold, and the dark field below a threshold.
[0003]
[Problem(s) to be Solved by the Invention] However, by the above-mentioned conventional approach, when dark parts other than a main photographic subject existed in a screen, in spite of having not been a backlight scene in fact, the ratio of the dark field below a predetermined threshold became high, and there was a possibility of carrying out a misjudgment law to it being a backlight scene.
[0004] This invention is made in order to solve the trouble of the above-mentioned conventional example, and even if it is the case where there is a part dark in addition to a main photographic subject, it aims at offering the backlight scene judging approach that it can judge whether it is a backlight scene, without carrying out a misjudgment law.
[0005]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the backlight scene judging approach of this invention divides an input image into two or more fields, searches for lightness for every field, performs the 1st judgment of being a backlight scene based on the number of fields which has the lightness more than a predetermined threshold, searches for saturation distribution from all image data further, and performs the 2nd judgment of being a backlight scene based on saturation distribution.
[0006] Moreover, in the 1st judgment, it is good also considering the value which is included in each of each field and which searches for lightness for two or more point of measurement of every, and has a large number most among the lightness of each point of measurement as lightness of the field concerned.
[0007] moreover, a group which has the same lightness continuously as compared with the lightness of the field which adjoins the lightness of each field, respectively -- one etc. makes a lightness field the independent field which has a field or lightness different, respectively, and even if it is the case where two or more lightness fields, such as having the lightness same in an image, exist, you may constitute so that it may recognize as another part of a respectively different body or the same body.
[0008] Moreover, it has the lightness below a predetermined value, and lightness fields, such as plurality which continues mutually, may be unified as a dark place field, and you may constitute so that the 1st judgment may be performed based on the ratio to the total number of fields of the number of fields contained to a dark place field.
[0009] Or you may constitute so that the 1st judgment may be performed based on a ratio with the average of each lightness of the field which has the lightness below a predetermined value, and unifies lightness fields, such as plurality which continues mutually, as a dark place field, and adjoins the average of each lightness of each field included to a

dark place field to a dark place field, and has lightness higher than a predetermined value.
[0010] Moreover, it is good also as a rectangle field which divided the image into the predetermined number for each field in length and a longitudinal direction, respectively.
[0011] Moreover, it may ask for a histogram from the saturation of all the point of measurement included in the whole image, and the 2nd judgment may be performed by comparing the variance of a histogram with a predetermined threshold.
[0012] Moreover, the storage which can be read by computer which recorded the backlight scene judging approach program of this invention The processing which divides an input image into two or more fields, and searches for lightness for every field, the processing which performs the 1st judgment based on the number of fields which has the lightness more than a predetermined threshold, When it judges with it being a backlight scene in the 1st judgment, saturation distribution was further searched for from all image data, and the processing which performs the 2nd judgment based on saturation distribution is memorized.
[0013] Moreover, the picture input device using an image sensor for the image processing system of this invention to input a photographic subject image, The image display device which displays the image inputted by the picture input device, and a lightness detection means to divide the inputted image into two or more fields, and to detect the lightness for every field, A 1st judgment means to judge whether it is a backlight scene based on the lightness of each detected field, A saturation distribution operation means to search for saturation distribution of the whole image using the image data from an image input means, and a 2nd judgment means to judge whether it is a backlight scene based on the saturation distribution acquired by the saturation distribution operation means are provided.
[0014] Moreover, it reaches [whether the part which has a light-and-darkness difference beyond a predetermined value in an image based on the 1st judgment result exists, and], and the lightness difference of the whole image may judge further whether it is below a predetermined value, and you may constitute so that image data may be amended based on the 1st judgment result and the 2nd judgment result.
[0015] Moreover, you may record with image data by making the 1st judgment result and the result of the 2nd judgment into a keyword.
[0016] Generally, in the case of a backlight scene, especially a portrait scene, etc., even if lightness is high, saturation is low [most backgrounds are those which is fading (the focus does not suit), and]. Moreover, main photographic subjects (part to the point) are shade, and are low. [of both lightness and saturation] Therefore, when it is a backlight scene truly, the saturation of the whole image is low and also concentrates saturation distribution on a small value. According to the backlight scene judging approach of above-mentioned this invention, it judges whether it is a backlight scene from the lightness (brightness) data of two or more points of an image. Furthermore, it judges whether it is a backlight scene using saturation distribution, and since it processes as a backlight scene only when it is distinguished that it is a backlight scene in both the 1st judgment and the 2nd judgment, the case where it is a backlight scene truly, and the case where some images have a dark part are distinguishable. Consequently, it becomes possible to prevent the incorrect judging of a backlight scene.
[0017]
[Embodiment of the Invention] (1st operation gestalt) The 1st operation gestalt of this invention is explained, referring to a drawing. Drawing 1 is drawing showing the configuration of the common image processing system which comes to connect the image display devices 2, such as CRT and a liquid crystal display, a keyboard 3, a scanner 4, a digital camera 5, and printer 6 grade with the well-known personal computer 1. The program of the backlight scene distinction approach of this invention is memorized by the storages 10, such as CD-ROM, is installed in the hard disk drive unit of a personal computer 1, and becomes usable by starting from a hard disk drive unit.
[0018] The block configuration in the case of the image processing system of the 1st operation gestalt is shown in drawing 2 . The image pick-up section 101 is the scanner 4 and the image pick-up equipment of digital camera 5 grade by which external connection was made. Digital image data are inputted into the data-processing section 100 which consists of a CPU, RAM, etc. through the image input section 102 which consisted of input/output interfaces etc., and receive a series of image processings mentioned later from the image pick-up section 101. The image data under [before an image processing] image processing and after an image processing is temporarily memorized and saved in the storage sections 103, such as RAM and a hard disk drive unit. Moreover, the image data processed by the data-processing section 100 is printed out by the output section 106 constituted from printer 6 grade by selection while it is displayed on the image display section which consisted of image-display-device 2 grades through the image output section 104 which consisted of input/output interfaces etc. Moreover, the enternal memory section 107 which consisted of a floppy disk drive, a memory card drive, etc. memorizes. Furthermore, although not illustrated, you may output to other personal computers through the Internet, LAN, etc.

[0019] Next, the backlight scene distinction approach of the 1st operation gestalt is explained. For example, the backlight scene image photoed by the digital camera etc. and its example of an image processing are shown in drawing 5 from drawing 3 . Moreover, the flow chart of the backlight scene distinction approach is shown in drawing 6 and drawing 7.

[0020] First, the image data which operated the image pick-up section 101 and was digital-signal-ized is inputted (step S100). The image pick-up section 101 incorporates image data with solid state image sensors, such as CCD, changes and outputs it to a digital signal, and outputs the brightness data of each color of R (red), G (green), and B (blue) about each pixel of a solid state image sensor, respectively. For example, in the case of the veneer type which uses one solid state image sensor, only one brightness data about one color of R, G, and B is obtained from one pixel, but brightness data are obtained also about R, G, and B each color for every pixel by interpolating the data from the adjoining pixel and suiting. In addition, since this invention aims to let the inputted image judge whether it is a backlight scene, an image pick-up and the explanation about the A/D conversion of a picture signal are omitted.

[0021] If image data is inputted, the data-processing section 100 will calculate the hue (Hue) H in the pixel, saturation (Saturation) S, and Lightness (Lightness) L from the brightness data for R, G, and B each color of every about each pixel of the solid state image sensor of the image pick-up section 101 (step S105). Here, the brightness data for R [about a certain pixel], G, and B each color of every are set to r, g, and b, respectively, and the hue H in the pixel, saturation S, and Lightness L are searched for by the following operation expression, respectively.

[0022]

[Equation 1]

$$L = 7.3 \times r + 7.59 \times g + 7.11 \times b \quad \cdots (1)$$

$$c1 = 7.7 \times r - 7.59 \times g - 7.11 \times b$$

$$c2 = -7.3 \times r - 7.59 \times g + 7.89 \times b$$

$$H = \tan^{-1}(c1, c2) \quad \cdots (2)$$

$$S = ((c1)^2 + (c2)^2)^{1/2} \quad \cdots (3)$$

[0023] In addition, this operation changes the brightness data of R, G, and B each color into each data of Hue H, saturation S, and Lightness L, and calls them a color space conversion. Moreover, backup preservation of the result of an operation may be carried out at a hard disk drive unit etc. As a result, it can consider, respectively that each pixel of a solid state image sensor is one point of measurement, and becomes the case where hue data, saturation data, and lightness data are measured for every point of measurement, and equivalence.

[0024] Next, the data-processing section 100 divides the image of imagination into a lengthwise direction and a longitudinal direction to the rectangle field of a predetermined number (a lengthwise direction and a longitudinal direction are eight pieces in this case), respectively, as shown in drawing 3 (step S110). In addition, ** which attaches 1-1, 1-2...1-8, 2-1, 2-2...2-8...8-1, 8-2...8-8, and an address rightward in order from the upper left in drawing about each rectangle field divided temporarily, respectively in order to give explanation easy.

[0025] Next, about all the pixels contained to the rectangle field in order about each divided rectangle field 1-1 to 8-8, the data-processing section 100 quantizes the lightness L calculated by the above-mentioned formula (1), for example from a dark side to a bright side in ten steps of 0-9, and creates the histogram of Lightness L. And lightness which most many pixels show is made into the lightness of the rectangle field. This processing is performed to all rectangle fields, and a total of 64 lightness L is determined about the rectangle field 1-1 to 8-8 (step S115). An example of lightness distribution of the backlight scene image of drawing 3 is shown in drawing 4 .

[0026] for example, the case where the profile parts of main photographic subjects and a background are contained to the rectangle field (for example, 2-3) in drawing 3 -- the inside of those for a main photographic subject part and a background -- either -- lightness with a larger area turns into lightness of the rectangle field. On the other hand, since the lightness of each rectangle field 2-2 contiguous to this rectangle field 2-3, 2-4, and 3-3 grade is the lightness of a main photographic subject part, or the lightness for a background, it becomes possible [specifying the profile of main photographic subjects] by measuring the lightness of each rectangle field. In addition, when what equalized the lightness of two or more point of measurement of each rectangle field is made into the lightness of the rectangle field, the middle value of the lightness of a main photographic subject part and the lightness for a background will be shown, and there is a possibility that the profile of main photographic subjects may become indistinct.

[0027] a group which has the same lightness continuously as compared with the lightness of the rectangle field where the data-processing section 100 adjoins the lightness of each rectangle field, respectively if lightness distribution is acquired -- let the independent rectangle fields which have a rectangle field or lightness different, respectively be lightness fields, such as one, (step S120). for example, drawing 4 -- setting -- the right from the left of the 1st line -- since -- ** which gives the same label to the rectangle field which shows the same lightness for the value of the

lightness L of each rectangle field as compared with order. Moreover, it compares not only with the rectangle field of the next door of the same line but with the lightness of the rectangle field of the same train of the line on one about each line of the 2nd less than line. And as long as the rectangle field which shows the same lightness continuously continues, one etc. makes a lightness field the field where the same label was given to those rectangle fields, and the same label was attached, and lightness distribution is divided into lightness fields, such as plurality. The result divided into the lightness [distribution / of drawing 4 / lightness] field is shown in drawing 5 .

[0028] since all the rectangle fields that compare drawing 5 with drawing 4 , for example, show lightness 7 in drawing 4 are continuing -- drawing 5 -- these -- the -- ** which considers as a 1st grade lightness field and attaches a label "0." ** which attaches a label "1" as lightness fields, such as the 2nd, since the rectangle field which shows lightness 8 in drawing 4 similarly is also continuing. On the other hand, since the rectangle field 5-6 which indicates the lightness 6 under drawing Nakamigi to be the rectangle field 6-2 which shows the lightness 6 at the lower left of drawing 5 , 6-3, 7-2, and 8-2, 6-6, 6-7, 6-8, 7-7, 7-8, 8-7, and 8-8 are separated ** which attaches a label "5" and "4" as a lightness field, such as differing although the same lightness is shown, respectively. The number of a label is the order of a field which appeared first.

[0029] Next, the data-processing section 100 has the lightness below a predetermined value, and unifies lightness fields, such as plurality which continues mutually, as a dark place field (step S125). In the example shown in drawing 4 and drawing 5 , it is the darkest and the field of the label "2" in which the lightness 1 dark to the 2nd is shown succeeding the field of the label "3" in which lightness 0 is shown continuously, and the field of a label "3" is unified. Although it does not exist in the example shown in drawing 4 and drawing 5 , when another field which shows lightness 0 exists in the same image, since it does not continue and labels differ, the field is not unified. Even if it is the case where two or more fields which have the lightness same in an image as a result exist, it is possible to recognize as another part of a respectively different body or the same body. In addition, in the example shown in drawing 5 from drawing 3 , although the field unified as a dark place field is a field of the label "2" in which the field and lightness 1 of the label "3" in which lightness 0 is shown are shown, it is not necessarily limited to this and may unify the field of the dark lightness 2, and other fields to the 3rd depending on the condition of an image.

[0030] Next, the data-processing section 100 asks for the ratio (pulse duty factor) of the unified number of rectangle fields of a dark place field which it has to the total number of rectangle fields, and a pulse duty factor judges whether it is a predetermined more than value, for example, 20%, (the 1st judgment: step S130). For example, when the one or less lightness number of dark place fields occupies 20% or more of the whole, it judges with it being a backlight scene.

[0031] When judged with it being a backlight scene in the 1st judgment (it is YES at step S130), the data-processing section 100 searches the boundary region contiguous to a dark place field (step S135). For example, in the example shown in drawing 4 and drawing 5 , the data-processing section 100 will make a boundary region the rectangle field 1-4 contiguous to the rectangle field 2-4, if the rectangle field 2-4 which appears first as a dark place field is searched. A boundary region is searched about the rectangle field 2-5 similarly included to a dark place field, 3-3, and 3-6...8-5.

[0032] If a boundary region is searched, the data-processing section 100 calculates the average of the lightness of all the rectangle fields included in the searched boundary region (step S140), and compares the average of the calculated lightness with the predetermined value 3.5, for example, lightness, (step S145). The lightness of a dark place field is 0 or 1, and with [the average of the lightness of a boundary region] 3.5 [or less], so greatly, a lightness difference can usually judge it to be photography, although it is dark in the whole screen.

[0033] When the average of the lightness of a boundary region is larger than 3.5 (it is YES at step S145), the lightness difference (contrast) of main photographic subjects and a background is large, and possibility of being a backlight scene is high. Then, the data-processing section 100 creates the histogram of saturation from the saturation data of each **** calculated at step S105 (step S150), and calculates the variance of saturation distribution from a histogram (step S155). Furthermore, it judges whether the calculated variance is smaller than the predetermined value 600 (the 2nd judgment: step S160). For example, when saturation is expressed in 256 steps of 0-255, the 2nd predetermined value is set to 600.

[0034] In the case of a backlight scene, it is portrait photography, and even if lightness is high, saturation is low [most backgrounds are those which is fading (the focus does not suit), and]. Moreover, main photographic subjects (part to the point) are shade, and are low. [of both lightness and saturation] Therefore, when it is a backlight scene truly, the saturation of the whole image is low and also concentrates saturation distribution on a small value. Therefore, when a variance is smaller than the 2nd predetermined value (it is NO at step S160), it judges with the data-processing section 100 being a backlight scene.

[0035] Moreover, when the lightness average is smaller than 3.5 (it is NO at step S145), and when the pulse duty factor of a dark place field is smaller than 20% (it is NO at step S130), and the **** value of saturation is larger than 600 (it is NO at step S160), it judges with the data-processing section 100 being usually a scene image.

[0036] Thus, since according to the 1st operation gestalt it judges whether it is a backlight scene from the lightness (brightness) data of two or more points of an image, and saturation distribution is used further and it judges whether it is a backlight scene when possibility of being a backlight scene is high, the case where it is a backlight scene truly, and the case where some images have a dark part are distinguishable. Consequently, it becomes possible to prevent the incorrect judging of a backlight scene.

[0037] (2nd operation gestalt) It explains, referring to a drawing about the 2nd operation gestalt of this invention. Drawing 8 is a flow chart which shows the image scene judging of the 2nd operation gestalt, and the image amendment approach, and drawing 9 shows gamma curve at the time of amending image data according to a judgment result. In addition, the hardware configuration of the 2nd operation gestalt is substantially the same as the case of the 1st operation gestalt, and omits the explanation. Moreover, about the part which overlaps the 1st operation gestalt, the explanation is omitted also about a software configuration.

[0038] First, the image data which operated the image pick-up section 101 and was digital-signal-ized is inputted (step S200), and brightness data are obtained about R, G, and B each color for every pixel. The data-processing section 100 calculates the hue H in the pixel, saturation S, and Lightness L from the brightness data for R, G, and B each color of every using the color space conversion approach explained with the 1st operation gestalt about each pixel of the solid state image sensor of the image pick-up section 101 (step S205).

[0039] Next, the data-processing section 100 divides the image of imagination into a lengthwise direction and a longitudinal direction to the rectangle field of a predetermined number, respectively (step S210), and determines lightness about each divided rectangle field (step S215). If the lightness of each rectangle field is determined, the data-processing section 100 will divide an image into lightness fields, such as plurality, as compared with the lightness of the rectangle field which adjoins the lightness of each rectangle field, respectively (step S220).

[0040] Next, the data-processing section 100 calculates the lightness difference for every ****** field (step S225), and that it is beyond a predetermined value (for example, lightness difference 7), i.e., an image scene, judges [the maximum lightness difference] whether it is a high contrast scene (step S230). A high contrast scene has an extremely bright part and a dark part in an image, and the pulse duty factor of the lowest (dark) part of lightness says 20% or less of case, and a backlight scene is distinguished.

[0041] When it judges with it not being a high contrast scene (it is NO at step S230), as for the data-processing section 100, that it is below a predetermined value (for example, lightness difference 3), i.e., an image scene, judges [the maximum lightness difference] whether it is the Rochon trust scene (step S235). The Rochon trust scene means a case so that the lightness of the whole image may be almost fixed.

[0042] When it judges with it not being the Rochon trust (it is NO at step S235), as for the data-processing section 100, an image judges whether it is a backlight scene (step S240). Since the judgment of being a backlight scene is the procedure same among the flow charts of the 1st operation gestalt shown in drawing 6 and drawing 7 as step S125 to S160, it omits the explanation. Since it is usually a scene image when it judges with it not being a backlight scene (it is NO at step S240), the data-processing section 100 outputs the image data to image-display-device 2 grade, without amending.

[0043] When it judges with it being a high contrast scene on the other hand (it is YES at step S230), When it judges with it being the Rochon trust scene (it is YES at step S235), and when it judges with it being a backlight scene (it is YES at step S240), the data-processing section 100 It is based on the lightness and saturation which were calculated by color space conversion processing of step S205, area size, etc. The object domain which performs image amendment in each case is extracted (step S245), and the optimal amendment gamma curve is chosen out of two or more amendment gamma curves beforehand memorized by the storage section 103 grade (step S250). For example, when it judges with their being a high contrast scene or a backlight scene, the data-processing section 100 chooses an amendment gamma curve as shown in drawing 9 (a), makes a too bright part a little dark, and makes a little bright the part which is too dark conversely. Moreover, when it judges with it being the Rochon trust scene, the data-processing section 100 chooses an amendment gamma curve as shown in drawing 9 (b). In addition, the amendment gamma curve is memorized in the form of a look-up table, discovers the value corresponding to input image concentration out of a look-up table, and is good also considering the value as output image concentration.

[0044] Thus, since according to the 2nd operation gestalt a high contrast scene, the Rochon trust scene, and a backlight scene is judged, and it responds to a judgment result, and image data is amended and it displays or prints from the image picturized by the digital camera 5 grade, a suitable image is obtained.

[0045] (3rd operation gestalt) It explains, referring to a drawing about the 3rd operation gestalt of this invention. Drawing 10 is a flow chart which shows the image scene judging approach of the 3rd operation gestalt, and keyword grant. In addition, the hardware configuration of the 3rd operation gestalt is substantially the same as the case of the 1st

operation gestalt, and the explanation is omitted. Moreover, since it is common also about a software configuration in the greater part of [an operation gestalt and], the explanation is omitted about the overlapping part. [the] [the greater part of]

[0046] In the flow chart shown in drawing 10 , when it judges with it being the Rochon trust scene when it judges with it being a high contrast scene (it is YES at step S230) (it is YES at step S235), and when it judges with it being a backlight scene (it is YES at step S240), the data-processing section 100 chooses keywords, such as high contrast, the Rochon trust, and a backlight, respectively (step S260), and saves a keyword in a database with image data (step S265).

[0047] With the 3rd operation gestalt, since a keyword is given, respectively and it saves in a database, without performing image amendment even if it judges with a high contrast scene, the Rochon trust scene, and a backlight scene, the arrangement, storage, and retrieval of an image on a personal computer become easy.

[0048] With each above-mentioned operation gestalt, (Other embodiments) In a personal computer 1 To the image display devices 2, such as CRT and a liquid crystal display, a keyboard 3, a scanner 4, a digital camera 5, and the common image processing system that comes to connect printer 6 grade Although it constituted so that the program of the backlight scene distinction approach of this invention might be started and a backlight scene judging, an image processing, etc. might be performed, you may be equipment of the dedication which is not limited to this and added the backlight scene distinction function and the image-processing device to image pick-up equipments, such as a digital camera.

[0049] Moreover, although the 2nd judgment by saturation is performed after the 1st judgment by lightness with each above-mentioned operation gestalt, it may not be **** limited to this and the sequence of the 1st judgment and the 2nd judgment may be reverse.

[0050] Furthermore, it constituted from each above-mentioned operation gestalt so that it might judge with the lightness and saturation of a HSL color space, but it is not limited to this color space, but if it is the parameter which can perform evaluation equivalent to lightness and saturation, it can substitute.

[0051]

[Effect of the Invention] According to this invention, an input image is divided into two or more fields as explained above. Since lightness is searched for for every field, the 1st judgment of being a backlight scene is performed based on the number of fields which has the lightness more than a predetermined threshold, saturation distribution is further searched for from all image data and the 2nd judgment of being a backlight scene is performed based on saturation distribution The case where the true backlight scene which the saturation of the whole image concentrates on a value also with saturation distribution it is low and small, and some images have a dark part can be distinguished, and it becomes possible to prevent the incorrect judging of a backlight scene.

[0052] Moreover, by making into the lightness of the field concerned the value which is included in each of each field and which searches for lightness for two or more point of measurement of every, and has a large number most among the lightness of each point of measurement in the 1st judgment Since the lightness of the part applicable to main photographic subjects and the lightness of the part equivalent to a profile change rapidly when the profile of main photographic subjects and a background is contained to one field, it becomes possible to distinguish the profile of main photographic subjects sharply.

[0053] One etc. makes a lightness field the independent field which has a field or lightness different, respectively. moreover, a group which has the same lightness continuously as compared with the lightness of the field which adjoins the lightness of each field, respectively -- Even if it is the case where two or more lightness fields, such as having the lightness same in an image, exist, it becomes possible by recognizing as another part of a respectively different body or the same body to distinguish the case where a true backlight scene and some images are dark.

[0054] Moreover, the case where the true backlight scene which the saturation of the whole image concentrates on a low value also with small saturation distribution, and some images have a dark part is distinguishable by asking for a histogram from the saturation of all the point of measurement included in the whole image, and performing the 2nd judgment by comparing the variance of a histogram with a predetermined threshold.

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CLAIMS

[Claim(s)]
[Claim 1] The backlight scene judging approach of dividing an input image into two or more fields, searching for lightness for every field, performing the 1st judgment of being a backlight scene based on the number of fields which has the lightness more than a predetermined threshold, searching for saturation distribution from all image data further, and performing the 2nd judgment of being a backlight scene based on saturation distribution.
[Claim 2] The backlight scene judging approach according to claim 1 characterized by making into the lightness of the field concerned the value which is included in each of each field, and which searches for lightness for two or more point of measurement of every, and has a large number most among the lightness of each point of measurement in the 1st judgment.
[Claim 3] a group which has the same lightness continuously as compared with the lightness of the field which adjoins the lightness of each field, respectively -- the backlight scene judging approach according to claim 2 which one etc. makes a lightness field the independent field which has a field or lightness different, respectively, and is characterized by what recognizes as another part of a respectively different body or the same body even if it is the case where two or more lightness fields, such as having the lightness same in an image, exist.
[Claim 4] The backlight scene judging approach according to claim 3 characterized by performing the 1st judgment based on the ratio to the total number of fields of the number of fields which has the lightness below a predetermined value, and unifies lightness fields, such as plurality which continues mutually, as a dark place field, and is contained to a dark place field.
[Claim 5] The backlight scene judging approach according to claim 3 characterized by performing the 1st judgment based on a ratio with the average of each lightness of the field which has the lightness below a predetermined value, and unifies lightness fields, such as plurality which continues mutually, as a dark place field, and adjoins the average of each lightness of each field included to a dark place field to a dark place field, and has lightness higher than a predetermined value.
[Claim 6] Each field is the backlight scene judging approach given in either of claims 1-5 characterized by being the rectangle field which divided the image into the predetermined number in length and a longitudinal direction, respectively.
[Claim 7] The backlight scene judging approach given in either of claims 1-6 characterized by performing the 2nd judgment by asking for a histogram from the saturation of all the point of measurement included in the whole image, and comparing the variance of a histogram with a predetermined threshold.
[Claim 8] The storage in which reading [computer / which recorded the backlight scene judging approach program which divides an input image into two or more fields, and includes ruble processing, the processing which performs the 1st judgment based on the number of fields which has the lightness more than a predetermined threshold, and the processing which searches for saturation distribution from all image data further, and performs the 2nd judgment based on saturation distribution in quest of lightness for every field] is possible.
[Claim 9] The picture input device using the image sensor for inputting a photographic subject image, and the image display device which displays the image inputted by the picture input device, A lightness detection means to divide the inputted image into two or more fields, and to detect the lightness for every field, A 1st judgment means to judge whether it is a backlight scene based on the lightness of each detected field, A saturation distribution operation means to use the image data from an image input means, and to search for saturation distribution of the whole image when judged with it being a backlight scene by the 1st judgment means, The image processing system possessing a 2nd judgment means to judge whether it is a backlight scene based on the saturation distribution acquired by the saturation distribution operation means.
[Claim 10] The image processing system according to claim 9 characterized by reaching [whether the part which has a

light-and-darkness difference beyond a predetermined value in an image based on the 1st judgment result exists, and], and for the lightness difference of the whole image judging further whether it is below a predetermined value, and amending image data based on the 1st judgment result and the 2nd judgment result.

[Claim 11] The image processing system according to claim 10 characterized by what is recorded with image data by making the 1st judgment result and the result of the 2nd judgment into a keyword.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing showing the configuration of a common image processing system.
[Drawing 2] It is drawing showing the block configuration of the image processing system of the 1st operation gestalt of this invention.
[Drawing 3] For example, it is drawing showing the backlight scene image photoed by the digital camera etc.
[Drawing 4] It is drawing showing lightness distribution of the backlight scene image shown in drawing 3 .
[Drawing 5] It is drawing showing the condition of having divided into the field which has equal lightness from the lightness distribution shown in drawing 4 .
[Drawing 6] It is the flow chart which shows the backlight scene distinction approach of the 1st operation gestalt.
[Drawing 7] It is a continuation of the flow chart of drawing 6 .
[Drawing 8] It is the flow chart which shows the image scene judging of the 2nd operation gestalt of this invention, and the image amendment approach.
[Drawing 9] (a) And (b) is drawing showing the amendment gamma curve used for image amendment in the 2nd operation gestalt, respectively.
[Drawing 10] It is the flow chart which shows the image scene judging of the 3rd operation gestalt of this invention, and the keyword grant approach.
[Description of Notations]
1: Personal computer
2: Image display device
3: Keyboard
4: Scanner
5: Digital camera
6: Printer
10: Storage (CD-ROM)
11: External storage
100: Data-processing section
101: Image pick-up section
102: Image input section
103: Storage section
104: Image output section
105: Image display section
106: Output section
The 107 enternal memory sections

[Translation done.]

* NOTICES *

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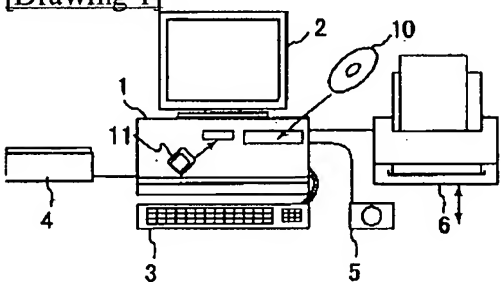
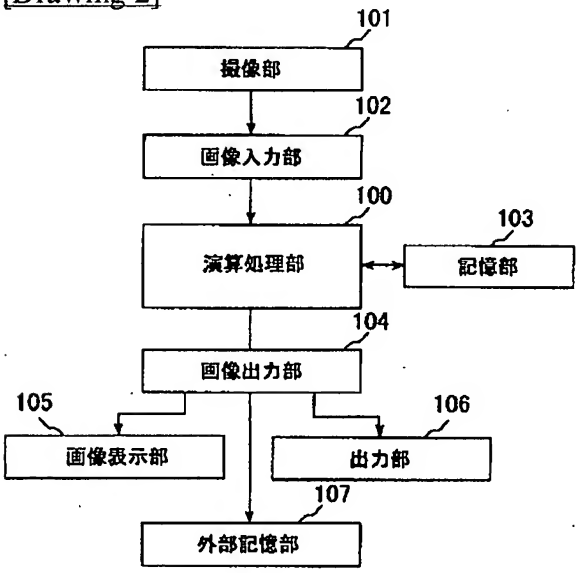
DRAWINGS

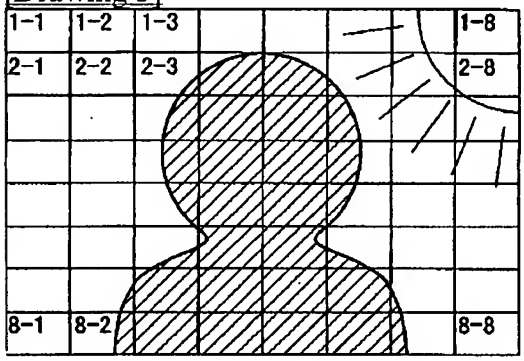
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 4]

行＼列	1	2	3	4	5	6	7	8
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3	7	7	1	1	1	7	7	7
4	7	7	1	0	0	7	7	7
5	7	7	1	0	0	6	7	7
6	7	6	6	0	0	6	6	6
7	7	6	1	0	0	1	6	6
8	7	6	1	0	0	1	1	6

[Drawing 5]

行＼列	1	2	3	4	5	6	7	8
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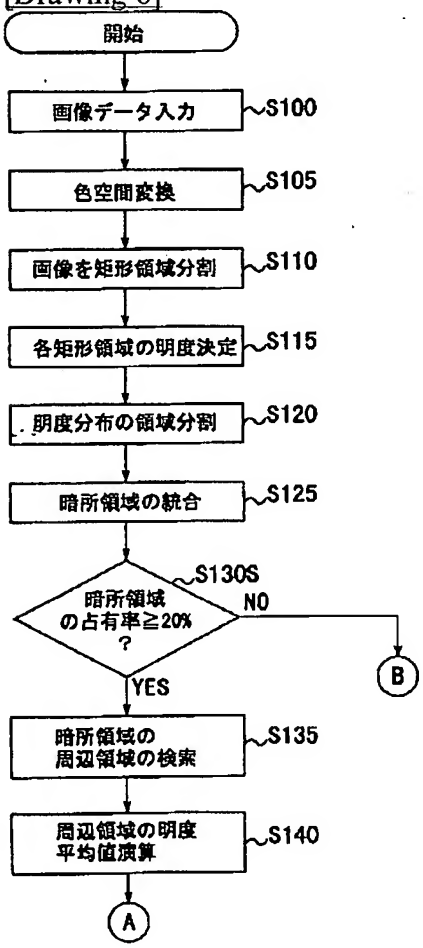
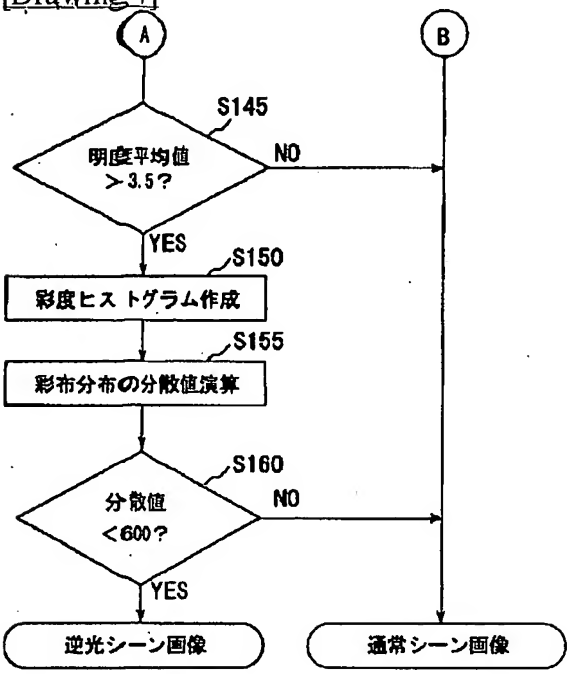
2	0	0	0	2	2	0	1	1
3	0	0	2	2	2	0	0	0
4	0	0	2	3	3	0	0	0
5	0	0	2	3	3	4	0	0
6	0	5	5	3	3	4	4	4
7	0	5	6	3	3	7	4	4
8	0	5	6	3	3	7	7	4

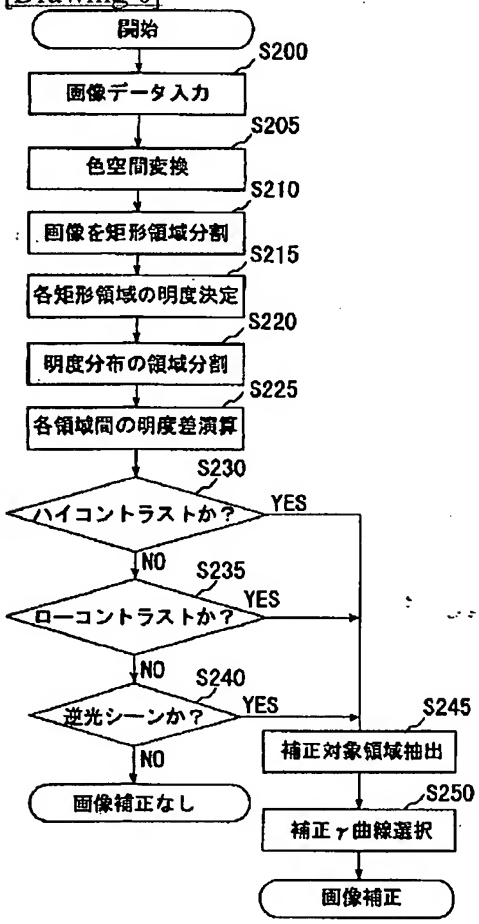
[Drawing 6]



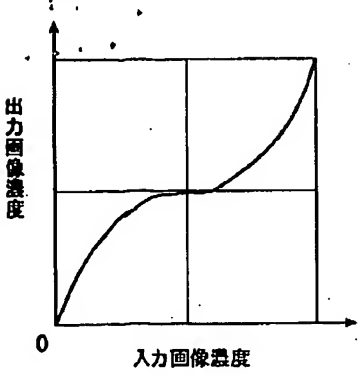
[Drawing 7]



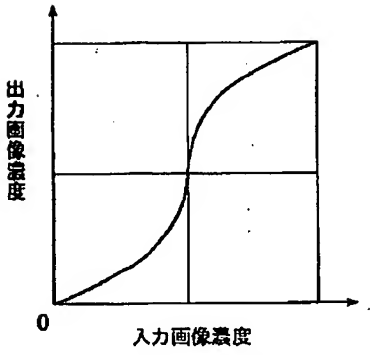
[Drawing 8]



[Drawing 9]



(a)



(b)

[Drawing 10]